QCD background estimate for W(→μν)+ jets
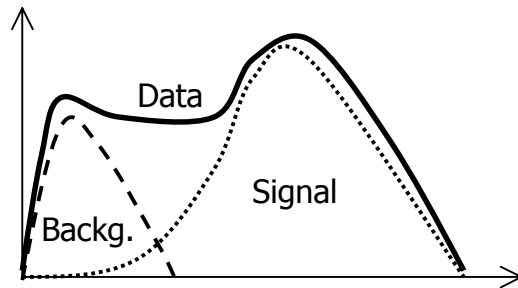
I have seen at least two ways of using fits to event distributions in order to estimate the level of background.

## a) fit data distribution to the sum of a signal and background contribution:

The Data sample corresponds to our W+jets sample with all selection cuts applied (jets, muon cuts, missing E_T).

distributions: in Run I inclusive W(→μν) analysis the halo distribution was used (this is just the energy in a hollow cone around the muon direction, something like E(0.4)-E(0.2), unnormalized). The isolation variable (ΔR between muon and jet) could be used as well.

signal:

1) what was used in Run I inclusive W analysis to determine the shape of the signal contribution is a sample of good W candidates with no jets in the opposite half of the detector (to veto the most typical QCD dijet topology).
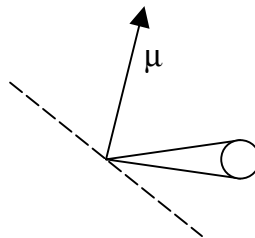
What we would like to do for the W+jets analysis is to determine the background contribution separately for ≥0,1,2,3,4.. jets, in order to check for topology biases. I clearly do not know if the above choice for the signal sample would lead to biases, another alternate is:

2) use the Z→μμ sample (after applying a window cut around the Z peak) .

background:

1) again, what was used in Run I inclusive W analysis was a sample selected from muons passing the W quality cuts but at a lower p_T range, a region which is dominated by semileptonic b/c decay.

   Alternatives:

2) use the W+jets sample, but with an upper missing E_T (fully corrected) cut, missing E_T<5-10GeV, for example.

3) use a dijet sample, where one muon is within 1 jet.

b) normalize the background to the data in a region where you know the data is background-dominated:
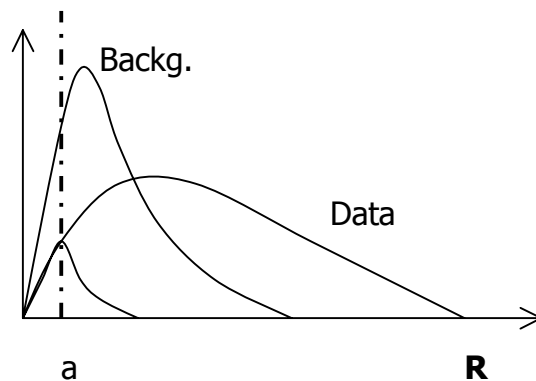
Again, the Data is our W+jets after selection cuts (all cuts but a cut on R). Here one only needs a background model. In this case we assume that for R<a the Data is background dominated, the background is normalized to account for ~100% of the Data for R<a, and the tail at R>a is the background contribution to the Data after all cuts.

It would be interesting to use both a) and b) methods and different sources for signal and background. Compare and study biases.